

# The Arthropod Fauna of Bovine Dung in Central New York and Sources on Its Natural History

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**Abstract:** The arthropod fauna of bovine manure in the vicinity of Ithaca, N. Y. is described. In addition, a list of the most useful references for the biology and natural history of dung arthropods is presented.

This report deals with the complex of species encountered during studies on the population dynamics, predator-prey relations and community structure of dung arthropods.

The collections were carried out during three summers (1965-1967) of research on a dairy farm in the vicinity of Ithaca, New York. During the summer of 1966, standard amounts of cow dung were set out in an open pasture and collected one, two, three and five days after exposure. These samples were then extracted using Tullgren funnels. A detailed description of the whole sampling procedure is provided in Valiela (1969). Other arthropods, especially adult flies, were collected around droppings with nets and suction devices.

Samples were collected only from an open pasture during the summer in an effort to simplify the system under study. Collections around shady areas, as well as during cooler parts of the season, would have provided greater taxonomic diversity, especially among the muscoid flies.

After an initial determination, specimens of a majority of the species were sent to specialists for identification.

A study of various aspects of the population dynamics of some important species has been published (Valiela, 1969). Reports dealing with the bulk of the prominent species in the community are in preparation, but since these papers center around the more abundant species, it seemed useful to record here as complete a list as could be compiled (see Table 1). Many species, particularly immatures, proved impossible to identify. However, since they could in general be determined to genus and separated from other specimens, an estimated number of these undetermined species is given in parentheses (Table 1). Voucher specimens of the prominent species are deposited in the care of the Curator of the Insect Collection at Cornell University. A large number of specimens of the listed species are available from the author for study by anyone interested.

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TABLE 1. Arthropods found in bovine dung in a pasture in Central New York. The occurrence code is 1) abundant; 2) common; 3) rare; 4) accidental. These categories are not intended as rigorous frequency classifications. In some instances it was not possible to assign a code number. All species except "accidentals" are thought to be members of the community. Abundant species are invariably found in all samples while rare ones in very few. Where no determiner is indicated, the identification is the author's. In virtually all cases the species listed occur both as adults and larvae ("accidentals" are an exception). Adults and larvae are mentioned when the determination included both. Determinations were made on adults unless otherwise indicated.

	Occurrence Code	Determined by:
<b>ACARINA</b>		
Acarine sp. (9 species?)	2	
<i>Macrocheles glaber</i>		R. C. Axtell
<i>M. muscaedomesticae</i>	1	"
<i>M. sp.</i>		"
<i>Parasitus</i> sp. (3 sp.?)	1	"
Uropodid sp.	3	
<b>COLLEMBOLA</b>		
Entomobryidae		
<i>Seira platani</i>	2	D. L. Wray
Poduridae		
<i>Hypogastrura glasgowi</i>	1	"
<b>MALLOPHAGA</b>		
<i>Damalinea bovicola</i>	4	
<b>PSOCOPTERA</b>		
Lachesillidae		
<i>Lachesilla pedicularia</i>	4	E. L. Mockford
Liposcelidae		
<i>Liposcelis</i> sp.	4	"
<b>COLEOPTERA</b>		
Staphylinidae		
<i>Aleochara bipostulata</i>	1	H. Dietrich
<i>A. imbricata</i>	3	"
Aleocharine sp. n. <i>Aleochara</i> (3 sp.)		
<i>Atheta sordida</i>	1	H. Dietrich
Aleocharine sp. n. <i>Atheta</i> (2 sp.)		
<i>Creophilus maxillosus</i>	2	
<i>Falagria dissecta</i>	1	H. Dietrich
<i>Hyponygrus obsidianus</i>	2	"
<i>Oxytelus tetracarlinatus</i>	1	"
<i>Philonthus cruentatus</i>	1	"
<i>P. rectangulus</i>	3	"
<i>P. varius</i>		"
<i>P. sp.</i> (2 sp.)		
<i>Platystethus americanus</i>	1	H. Dietrich
Staphilinid adults (9 unidentified sp.)	3	
" larvae (2 " sp.)	2	
<i>Trogophloeus (arcifer?)</i>	3	H. Dietrich
Ptiliidae		
<i>Acrotrichis</i> sp. (n. <i>sericans</i> )	1	H. Dybas
<i>Nephanes</i> sp. (n. <i>titan</i> )	3	"
Histeridae		
<i>Hister abbreviatus</i>	3	R. L. Wenzel
<i>Saprinus</i> sp.	2	

TABLE 1. *Continued.*

	Occurrence Code	Determined by:
Hydrophilidae		
<i>Cercyon</i> sp. adults (10 sp.)	1	
<i>Cercyon</i> sp. larvae (unidentified)		
<i>Sphaeridium bipostulatum</i>	1	W. J. Brown
<i>S. lunatum</i>	1	"
<i>S. scarabaeoides</i>	1	"
Nitidulidae		
<i>Carpophilus brachypterus</i>	4	
<i>Omosita colon</i>	4	
Chrysomelidae		
<i>Longitarsus</i> sp.	4	R. White
Elateridae		
<i>Melanotus</i> sp. larvae	4	T. J. Spilman
Scarabaeidae		
<i>Aphodius erraticus</i>	1	O. L. Cartwright
<i>A. fimetarius</i>	1	D. M. Anderson, O. L. Cartwright
<i>A. fossor</i>	1	O. L. Cartwright
<i>A. granarius</i>	2	"
<i>A. haemorrhoidalis</i>	1	D. M. Anderson, O. L. Cartwright
<i>A. prodromus</i>	2	O. L. Cartwright
<i>A. ruricola</i>	3	"
<i>A. stercorosus</i>	2	"
<i>Aphodius</i> larvae (unidentified)		
<i>Onthophagus hecate</i>	3	
<i>O. nuchicornis</i>	3	O. L. Cartwright
<i>O. pennsylvanicus</i>	3	
DIPTERA		
Psychodidae		
<i>Psychoda alternata</i>		L. W. Quate
<i>P. pusilla</i>		"
<i>Psychoda</i> sp. (larvae)	1	A. Stone
Ceratopogonidae		
<i>Forcipomyia bipunctata</i>		W. W. Wirth
<i>F. brevipennis</i>		"
Scatopsidae		
<i>Psectrosciara</i> sp.	4	
<i>Rhegmoclema</i> sp.	4	
<i>Scatopse fuscipes</i>		A. Stone
Sciaridae		
<i>Bradysia coprophila</i> (adults & larvae)	4	A. Stone
<i>Bradysia</i> sp.	4	"
Cecidomyiidae		
Unidentified adults	4	
Phoridae		
Phorid sp.	4	
Sphaeroceridae		
<i>Leptocera</i> sp.	1	C. W. Sabrosky
Syrphidae		
<i>Eristalis tenax</i> (larvae & adults)	4	
Stratiomyidae		
<i>Microchrysa polita</i> (adults & larvae)	2	
<i>Sargus cuprarius</i> ( " " )	1	W. W. Wirth
Anisopodidae		
<i>Sylvicola punctatus</i>	3	A. Stone

TABLE 1. *Continued.*

	Occurrence Code	Determined by:
Sepsidae		
<i>Saltella sphondylii</i> (adults & larvae)	1	G. Steyskal
<i>Sepsis biflexuosa</i>		"
<i>S. neocynipsea</i>	1	"
<i>S. punctum</i>		"
<i>S. vicaria</i>		"
<i>Sepsis</i> sp. larvae	1	
Piophilidae		
Piophilid sp.	4	
Drosophilidae		
Unidentified adults	4	
Chloropidae or Milichidae		
Unidentified adults	4	G. Steyskal
Anthomyidae		
<i>Scatophaga stercoraria</i>	2	
Muscidae		
<i>Haematobia irritans</i> (larvae)	2	C. W. Sabrosky
<i>Hydrotaea tuberculata</i> (larvae)	3	G. Steyskal
<i>Hylemya</i> (?) sp. (larvae)	3	"
<i>Morellia</i> sp.		
<i>Musca autumnalis</i> (adults & larvae)	1	
<i>M. domestica</i> (larvae)	4	R. Gagné
<i>Muscina stabulans</i>		
<i>Orthellia caesarion</i> (adults & larvae)	2	
Calliphoridae		
<i>Phaenicia</i> sp. (larvae)	4	R. J. Gagné
Sarcophagidae		
<i>Ravinia l'herminieri</i> (adults & larvae)	1	W. L. Downs
<i>Sarcophaga</i> sp. (s.l.) (larvae)	1	R. J. Gagné
<i>Sarcophaga</i> sp. (s.l.) (adults)	1	
HYMENOPTERA		
Formicidae		
<i>Lasius flavus</i>	4	
Scelionidae		
<i>Telenomus</i> sp.		P. M. Marsh
Diapriidae		
<i>Basalis</i> sp.		"
Pteromalidae		
<i>Spalangia nigripes</i>		B. D. Burks
Braconidae		
<i>Aphaereta pallipes</i>	1	P. M. Marsh
<i>Asobara</i> sp.		"
<i>Blacus</i> sp.		B. D. Burks
<i>Pentapleura</i> sp.		P. M. Marsh
Cynipidae		
<i>Cothonaspis</i> sp.		B. D. Burks
Figitidae		
<i>Xyalophora quinquelineata</i>	2	

Much biological information has accumulated about the arthropods of dung and has been compiled by several authors. It therefore seems redundant to describe here the natural history of each species encountered. This is particularly the case in view of the fact that in general dung faunas are cosmopolitan. Many species and virtually all genera, listed in this paper, can be found in widely distant geographical locations (cf. Bogdanow, 1901; Duffield, 1937; Hafez 1939; Hammer, 1942; Mohr, 1943; Snowball, 1944; Laurence, 1954; Sanders & Dobson, 1966; Poorbaugh *et al.*, 1968). However, it seems useful to provide a guide to the relevant literature. Table 2 presents a list of the main sources of information on the natural history of the arthropods involved. In general, the purely taxonomic works are not included. For the face fly few of the many papers are cited since a partial bibliography is already available (Smith *et al.*, 1966; 1967).

TABLE 2. List of the more useful sources on the biology and natural history of dung arthropods. The more general papers which deal with entire faunas or large groups of dung arthropods are included in the references section rather than in this table.

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ACARINA

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TABLE 2. *Continued.*

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## HYMENOPTERA

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As a pertinent aside, the affinities of dung faunas with those of sea wrack (Backlund, 1945; Ardö, 1957), carrion (Fuller, 1934; Reed, 1958; Payne, 1965) and other decaying substrates (Walker, 1957; Bornemissza, 1957) should be noted. This phenomenon suggests similarities in the environments provided by such accumulations of organic matter. The study of such similarities in environments of diverse origin would be of interest to the student of comparative community ecology. Dung insects also offer very interesting opportunities to zoogeographical studies because of their relationships to the spread of cattle and since many documented cases of animal invasions are known (cf. Brown, 1940 for example). A study of some aspects of the invasion of North America by the face fly is being prepared.

Dr. E. J. Hansens of Rutgers University first suggested this topic a number of years ago. The aid of Dr. W. H. Anderson and his staff at the Insect Identification and Parasite Introduction Research Branch, U.S.D.A., is acknowledged, and the names of the taxonomists responsible for the determinations are included in Table 1. This research was conducted under a predoctoral fellowship from the National Institute of Health at Cornell University. The manuscript was completed with the support of N.I.H. Postdoctoral Fellowship 1 TO1 GM01751-01 at Michigan State University.

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